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SIMbox Version 5.7 Release Notes

Version Statement

SimiGon is proud to release SIMbox version 5.7.

The goal of this version release is to provide the SIMbox ecosystem with significantly more scalability, capabilities and performance improvements.

This version includes Virtual Reality support enhancements, a new terrain engine, major upgrades to the SIMbox proprietary Image Generator and numerous under-the-hood improvements on the Learning Management System and the SIMbox Developer Environment.

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1. What's New in Version 5.7

SimiGon is proud to announce the release of SIMbox version 5.7. Our newest release is packed with many new capabilities along with major performance upgrades. SimiGon is at the forefront in taking advantage of disruptive Commercial Off the Shelf (COTS) hardware to unleash new technologies such as Virtual, Augmented and Mixed (VAM) Reality in the training world.

This version demonstrates SimiGon's commitment as a training and simulation technology leader. Our Research & Development (R&D) is driven by a desire to innovate, and our understanding of the market needs for competitive and cost effective solutions. This release has many new features and improvements based on the valuable input and feedback from our global SIMbox ecosystem.

We have invested significant R&D in SIMbox's proprietary image-generation system with a new terrain engine that implements the Common Database (CDB) standard. This standard is the future of high-fidelity simulation and has many benefits to organizations and end users with its ultra-crisp resolution. With the CDB capability, SIMbox joins a select club of advanced Image Generators (IG).

A pioneer in implementing Virtual Reality (VR) technologies, SimiGon has extended its native support for VR headsets. SIMbox is hardware device agnostic so our partners and customers can select the hardware most suited to their needs. The powerful SIMbox SDK allows us and our partners to easily connect to current and emerging Virtual, Augmented and Mixed reality headsets, haptic devices, input devices, force feedback and other motion platform devices.

Numerous improvements and additions have been made to SIMbox SideView, our distributed rendering solution. The new SideView provides a cost effective, scalable and reliable high-performance-rendering alternative for our partners and the industry. This solution will serve as the basis for any deployment scenario, ranging from a simple multi-screen solution that requires more than a single machine to full-size domes with multiple-projection channels. SideView also includes a new automation layer, enabling site administrators to remotely manage slave image generation machines that are part of large-scale arrays such as domes, and helps them cut down on management and setup time.

SIMbox IG system now uses 64 bit processes as a default, enabling our partners to use extremely high detailed terrain databases for both OpenFlight and CDB.

Our advanced IGs are already deployed in a state-of-the-art FAA Level 6 simulator and dome, including 13 projection channels and a high-fidelity visual scene and motion model.

SIMbox now includes many other new capabilities enabling our partners to harness this technology and widen their market reach into new domains and applications. This scalable and extensible technology is now used as the baseline for a state-of-the-art maintenance training facility supporting thousands of aircraft technicians annually.

SIMbox LMS Server has been upgraded through an extensive process of refactoring and tuning and has significantly improved performance over multiple domain sites with high load of learning material and users. The system-infrastructure development has further improved the end user experience.

SIMbox LMS also added a new compartmentalization module. In addition to the existing classification and domain systems, it is now possible to restrict access to learning content by designating user groups and Knowledge Center subjects. This new module provides a quick

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and easy way for content managers to administrate access, either by defaulting to a complete lock down or to an open system.

Additional stability and performance enhancements have been made in the underlying Distributed Mission Training (DMT) and Voice over IP (VoIP) subcomponents. This provides partners additional Return on Investment (ROI) by further leveraging SIMbox's inherent technology core without the need for ancillary tools.

SIMbox's competitive advantage, and the reason it is a key training component in aviation programs worldwide, is as an all-encompassing, out-of-the-box enterprise training system, from development through the complete training cycle.

We are excited how SIMbox version 5.7 is the evolution of our technologies scalability, extensibility and re-usability, enabling our partners to deploy their training content across different platforms, from laptops to full-flight simulators using various hardware configurations such as VR/MR/AR and multiple projector, large-dome systems.

Aside from the highlights, we have also improved product performance and stability by adding many under-the-hood features and bug fixes.

We are always looking to improve our services and technology for our loyal partners and customers. We continue to look to you to learn more about the business and technical challenges you are facing so we can shape our next generation of technology, focusing on your future needs and implementing the required solutions.

I would like to take this opportunity and thank all our partners for using our technology and products to disrupt the training industry. The global SIMbox ecosystem is the key to our sustained success. We will continue to develop and invest in R&D to meet your challenges and continue to provide amazing support. I and my team appreciate the trust you have in our products and look forward to your feedback and our next challenge.

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VP, Research & Development

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2. SIMbox Graphic Engine

2.1. Support for CDB Terrain

In version 5.7, SIMbox's proprietary graphics engine includes a new terrain engine implementation supporting the Common Database (CDB) terrain standard. CDB is a standard currently under the responsibility of the Open Geospatial Consortium (OGC).

In a nutshell, CDB is a structure of folders, where each folder represent a real-world tile, and each folder contains a nested structure of sub folders representing optional increasing level of details (LOD). These folders may contain the following (simplified) information elements:

1. Height map.
2. Satellite overlay imagery.
3. Land classification (for example, sea, country and city).
4. 3D models and their placement (including power lines).
5. Metadata regarding roads and railroads structures.
6. Metadata regarding position and type of lights (for example, roads, runways and cities).
7. Height query and line of sight related data.

Previously, SIMbox graphics engine supported only OpenFlight terrain-database format. The main benefit of CDB over OpenFlight is that the terrain surface is built from images and not from pre-created meshes. This enables the use of advanced GPU algorithms like the one SimiGon used in its implementation - similar to "Geometry Clipmaps".

Another benefit is the ability to update only certain tiles or portions of the terrain DB without having to "stitch it" to the sibling tiles by recreating the entire terrain database.

The CDB's added layers of information per tile (for example, land classification, road networks etc.), the LOD folder system, and the format itself allows the end user to configure the system and limit the load according to the specific system-deployment needs and capabilities. For example, choose a lower LOD to limit the number of models or trees that load and stress the graphics scene.

Version 5.7 supports OpenFlight terrains alongside CDB terrains and most of the inner components of the graphics engine are shared across both implementations - in other words, both formats use OpenFlight models and therefore both use the same inner implementation for loading and rendering models.

Since CDB rendering is much more demanding than OpenFlight, SimiGon developed a 64 bit rendering client process that communicates with the main simulation process, enabling it to utilize more memory. In version 5.7 the default rendering technique is a dedicated 64 bit client for both OpenFlight and CDB terrains. The main simulation process remains a 32 bit process in order to provide backwards compatibility for existing SIMCO developed content.

SIMbox CDB terrain engine utilizes advanced GPU and DirectX features:

● The surface is rendered in a technique based on geo clipmaps but more advanced that uses tile resources so that anisotropic filtering can be used.
● The surface is "round earth", meaning it curves like the real surface of the planet.
● The models use texture arrays, instancing and other techniques to lower the number of batches so thousands of different model types with hundreds of thousands of models, and hundreds of thousands of point lights can be visible.
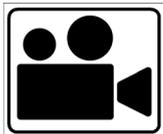● Advanced night texture support for models.

SIMbox CDB terrain engine supports most of the core capabilities defined in the standard, with support for additional capabilities to expand as the product evolves.

This is a screen shot showing the SIMbox CDB Terrain:

The SIMbox CDB Terrain

Click here to view the SIMbox CDB Terrain Engine Highlights video on YouTube.

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3. SIMbox Simulation

3.1. Play Sounds on a Specific Audio Device

Version 5.7 provides new capability that enables content developers to play sounds on a specific device.

When running a session in SIMbox, there are several sources for sounds and audio, such as:

- Environment/Background sounds (engine, alarms, explosions)
- VI guidance (using text to speech)
- Intercom/radio communication in DMT/Instructor Operator Station (IOS) sessions.

To get a more realistic simulation, it's sometimes preferable to play different sounds using different audio devices connected to the machine.

For example, if you have both speakers and a headset connected to your computer you can redirect intercom/radio communication to the headset while playing environment/ background sounds to the speakers.

3.2. Extend Navigational Aids

Version 5.7 improves the Navigational Aids by extending the VOR (VHF Omni-directional Range) and NDB (Non-Directional Beacon) objects and queries to include ICAO (International Civil Aviation Organization) and Runway data that exists in the NavAids database.

3.3. Improved SIMbox VoIP System Latency

Version 5.7 improves SIMbox VoIP System latency to be lower than industry standards.

The acceptable industry standard for software-based VoIP latency is 150 milliseconds. The Operating System and encoding and compression components create a latency of 30-40 milliseconds. The network does not add more than a few more milliseconds (topology dependent). This results in a latency of around 110 milliseconds (or lower) that provides a high-quality communication experience.

3.4. Display SIMbox VoIP Latency

Version 5.7 helps to analyze the Voice over IP (VoIP) radio and intercom communication by displaying the VoIP latency value. Latency is calculated from the time SIMbox VoIP engine receives the sound data packet from the capturing component, until it is sent to the network (this value is encoded into the packet); and from the time it is received from the network until it's sent to the rendering sound component.

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You can view the latency value by right-clicking on the VoIP server icon in the system tray (when a DMT session is running) and selecting 'Output Window' from the context menu.
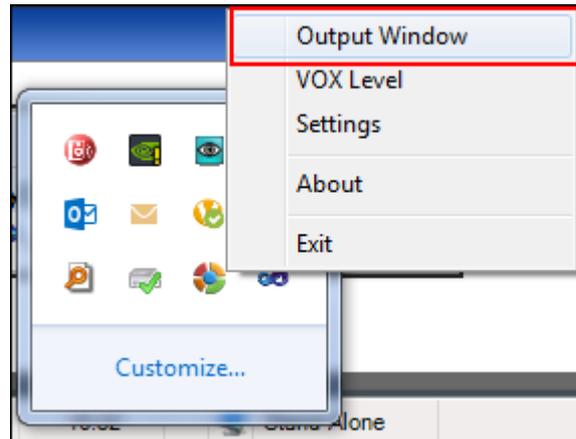
Then check the Latency checkbox at the bottom of the output window dialog. When the VoIP communication is active, the latency value will appear in the dialog:
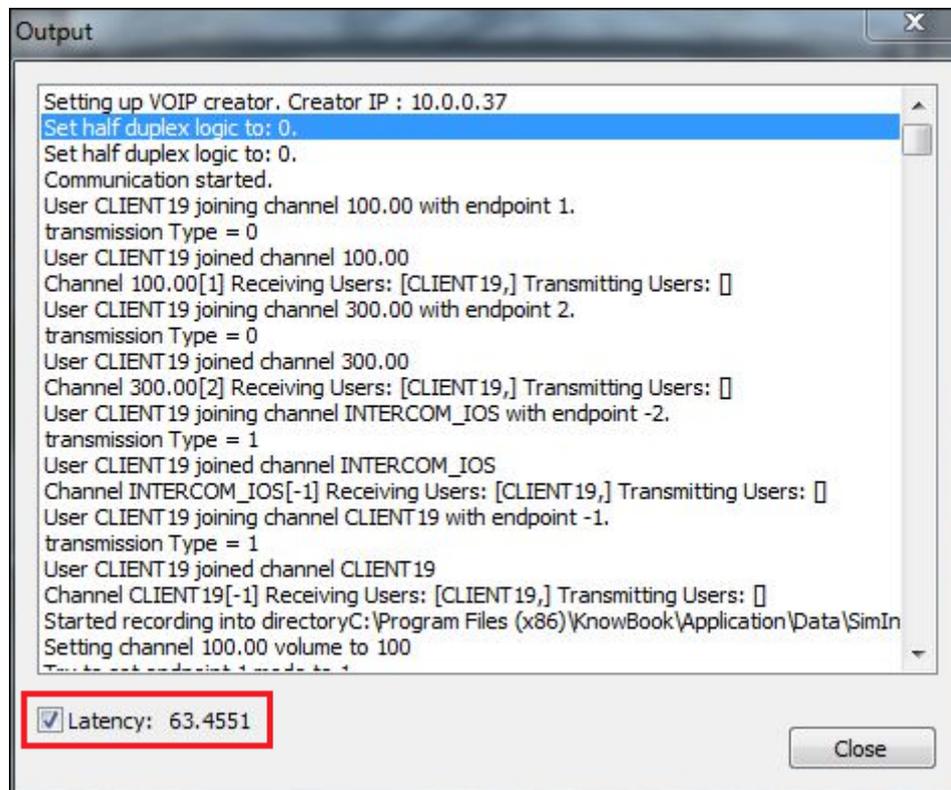
*The Output Dialog Showing the Latency Value*

3.5. Automatic Dump File Generation

Version 5.7 improves the debugging support by providing the option to generate dump files automatically when the simulation or IG rendering client(s) crash, and the options to include these dump files in the logs generated by the Send-Logs-to-Support utility.

The memory dump file is created when these processes crash. These files contain a copy of the computer's memory at the time of the crash.

You can enable the memory dump generation during the simulation by selecting **Start**->**Programs**->**KnowBook**->**Settings**->**Simulation Settings**. Set the Error Handling options in the General tab of the Simulation Settings dialog appears.
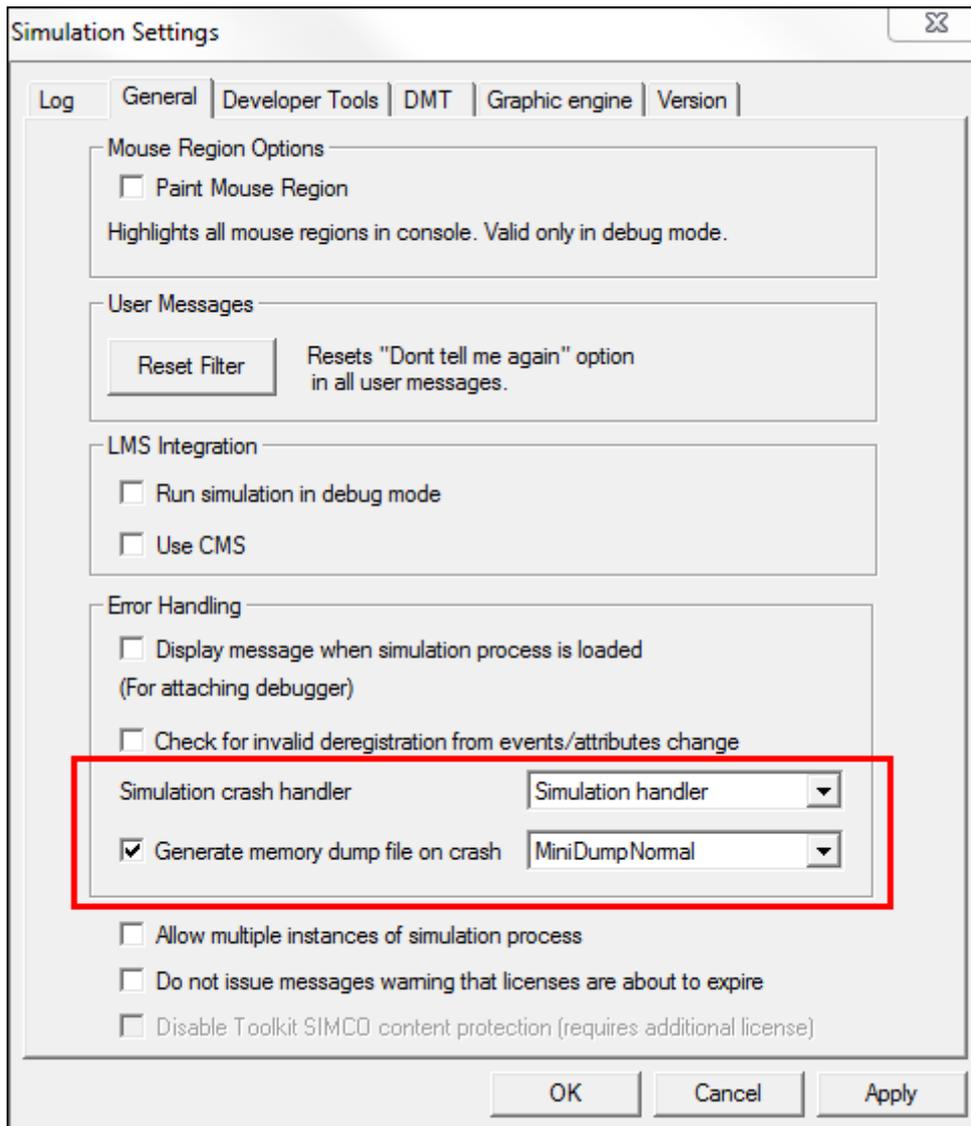
The Simulation Settings Dialog, General Tab

There are two types of dump files available, depending on your requirements:

- **MiniDumpNormal** - Include just the information necessary to capture stack traces for all existing threads in a process.

- **MiniDumpWithFullMemory** - Include all accessible memory in the process. The raw memory data is included at the end, so that the initial structures can be mapped directly without the raw memory information. This option may result in a very large file.

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4. SIMbox Toolkit

4.1. SDK

4.1.1. SIMbox SDK Add-On for Visual Studio 2015

Version 5.7 provides the SIMbox Software Development Kit (SDK) provides a SIMbox SDK add-on for Visual Studio 2015.

4.1.2. Breaking Changes in Console Components

The following version 5.7 Console API and AGI objects contain breaking changes:

Deprecated Function	Description	Workaround
TriD::CreateOGLRender	This API creates an AGI rectangle into which OpenGL will render. This requires the Graphic Engine (GE) to run in OpenGL mode. However, OpenGL rendering engine is no longer supported in 5.7 because OpenGL does not support all of the GE features. In addition, this API will not work in multi-process.	Refer to 3rd Party OpenGL Instrumentation. The OpenGL instrumentation API hooks into the graphic engine render cycle. It allows using OpenGL and opens a communication layer between the simulation and the rendering dll. When using multiprocess (by default) the rendering DLL must be compiled in 64 bit so it can be loaded in the rendering process.
Agi::RenderVideoCamera ToImage	This AGI object will not work in multi-process as the render window might not exist on the same computer.	In 5.7, the default rendering mode is multi process, and therefore it needs to be disabled. Open the Graphic Engine Side View Configuration, select Multi process mode as "Disabled". Refer to Side View. CDB terrains will not work well when disabling multiprocess rendering due to memory size limitations.

5. Learning Management System (LMS)

## 5.1. Query an LMS Item Metadata Using Web Services

Version 5.7 enhances the External Web Services.

The ExternalBridgeSI.QueryItemLastVersionMetadata Method provides full access to the imsmanifest.xml file using XPath queries.

5.2. Managing the Access to Content

Version 5.7 provides a new capability to Manage Content Access. This feature is presented alongside with the existing mechanism (e.g., classification, domains) and allows content administrators to deny or provide user groups access to knowledge center subjects.

Right-click on a subject in the Subjects tree, and select the **Manage Content Access** option from the context menu. The **Manage Content Access For: {subject}** dialog appears where you select the Allow or Deny check-box per User group.
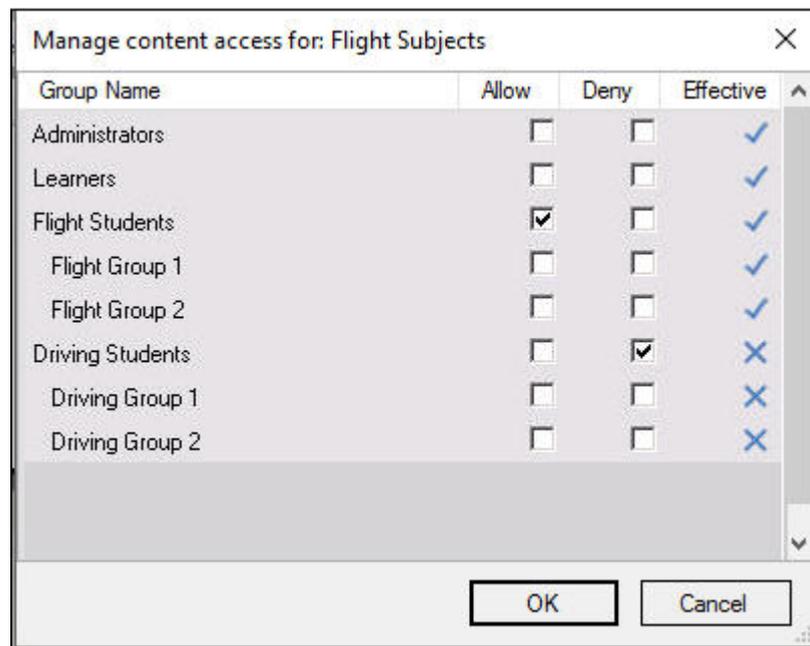
Selecting the Group Access from the Allow and Deny Columns

Select the check box in the **Allow** column to define group access to the subject. A check box selected in the **Deny** column bars the group from viewing the subject. Each user will see a partial subjects tree reflecting the effective permissions aggregated from all the user groups he is a member of.

The system is using a global settings defining the default mode -

1. Everything is accessible, start denying subject from groups. This is the default configuration.
2. Everything is blocked, start allowing subjects to groups.

For more information, refer to the KnowBook User Guide, page 283.